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A Methodology for Determining the Amount of Artillery Required in an Army Offensive Operation Conducted Without the Use of Nuclear Weapons

by
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In his article, "The Artillery Offensive--The Primary Method of Combat Use of Artillery in an Offensive Operation Conducted with Conventional Means of Destruction"*, which was based on a profound analysis of World War II experience and the subsequent development of the artillery of the Ground Forces, Marshal of Artillery K. Kazakov has indicated a practicable way of further improving the methods of employing artillery in various conditions of conducting modern war.

We fully share his opinion concerning the necessity of reviving the artillery offensive in operations carried out without the use of nuclear weapons. At the same time, taking into account the urgency of this problem, we would like to examine in more detail one of the subjects touched upon in the article--the amount of artillery required to conduct an artillery offensive in an army.

As shown by the experience of the past war, this requirement will vary in different stages of an artillery offensive (to carry out fire preparation, to provide artillery support, and to support combat in the depths of the defense). In this case, the greatest amount of artillery is required during the period of fire (artillery) preparation.

At present there are several methods of determining the amount of artillery required to carry out artillery (fire) preparation. One of them is to calculate the number of guns based on the cited volume of fire missions. The essence of this method consists of the following. The anticipated amount of missions to be accomplished by artillery in the sector of the breakthrough is calculated; in so doing, all missions are conventionally reduced to a single one--to neutralize sheltered manpower with full density (specified area). The required amount of artillery is calculated in accordance with the established amount of missions and the fire capabilities of a single gun (the calculation is made for a 122-millimeter gun) for the planned duration of the artillery preparation.

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* Collection of Articles of the Journal "Military Thought", 1969, No. 3 (88).

However, when calculating by this method, the necessity of using the most advantageous method of destroying targets is not taken into consideration and the requirement for artillery is also underestimated; the number of guns engaged in the simultaneous delivery of fire on a target is reduced and, consequently, the density of fire is also decreased. This can be seen in the following example.

To neutralize a battery of self-propelled artillery mounts (when firing at a range of up to 10 kilometers) requires the expenditure of 330 rounds. Since the size of the specified target is only 2.2 hectares, it would seem that a single battery could fulfil this task. However, to do this would require 17 minutes, delivering fire successively at three sight settings. In this case, the density of fire would amount to less than 9 rounds per hectare per minute, and errors in preparing the settings for firing would cause all of the battery's salvos to be deflected to one side. In these conditions, the effectiveness of fire would be low and the enemy battery could escape from under the shelling.

At the same time, when a battalion does the firing, the given task can be fulfilled in 6 minutes and the density of fire will amount to 27 bursts per hectare per minute. Furthermore, since the firing errors of several batteries will, as a rule, take effect on various sides, the probability of covering the target will be considerably enhanced.

Estimating the required amount of artillery by the cited sizes of the targets (the amount of fire missions) considerably complicates specific fire planning in artillery headquarters, since fire missions have to be allocated among separate batteries. And this, in its turn, hampers fire control.

Therefore we must base the methodology of determining the amount of artillery required to break through a defense on a method of fulfilling fire missions (methods of firing for effect) which ensures we achieve the required effectiveness with a minimum expenditure of shells in the shortest possible time, i.e., a method which produces a high density of fire against the target being destroyed.

The most advantageous method of determining the amount of artillery required for a fire preparation is the following. Initially, on the basis of specific reconnaissance data (interpreted aerial photographs, results of laser and optical rangefinder intersection, and also by means of radar and acoustic reconnaissance) we determine the overall amount of missions which are to be accomplished by artillery in the breakthrough sectors and the immediate flanks (number of platoon strongpoints of first-echelon battalions, artillery and mortar batteries, command posts, radar stations,

etc.). Based on established norms for the number of guns to be engaged in destroying individual targets, we calculate the overall number of guns needed to simultaneously fulfil all of the missions entrusted to the artillery.

In so doing, the following estimating norms are used: to neutralize personnel and fire means in strongpoints--two guns per hectare of target area; to neutralize a self-propelled artillery battery--from 9 to 18 guns; to neutralize a mortar battery (platoon) or radar station--6 guns; to neutralize a brigade command post--12 guns; and to neutralize a division forward command post--18 guns.

Strongpoints and reserves located in the depth are destroyed, as a rule, as secondary targets by the artillery designated to accomplish the primary missions of fire preparation, and when requirements for artillery are being determined, these targets do not enter the calculations.

Let us examine a specific example of an artillery requirement arrived at by the proposed method.

A combined-arms army (made up of one tank division and four motorized rifle divisions) is breaking through the enemy defense on two axes. Two motorized rifle divisions are breaking through the first sector, of 8 kilometers, and one motorized rifle division is breaking through the second sector, of 4 kilometers. One tank division and one motorized rifle division are in the second echelon. The calculation of the required amount of artillery for the fire preparation is cited in Table 1.

(See Table 1 on following page.)

Table 1

Target nomenclature	Number of Targets		Required number of artillery (guns)		
	Sector No. 1	Sector No. 2	Sector No. 1	Sector No. 2	Total
Company strongpoints of first-echelon battalions	10	6	360	216	576
Battalion command posts	3	2	18	12	30
Brigade command posts	2	1	24	12	36
Division forward command posts	1	1	18	18	36
Mortar platoons	9	6	54	36	90
Self-propelled artillery batteries	15	10	180	120	300
"Honest John" batteries	1	1	12	12	24
203.2-millimeter howitzer batteries	2	1	36	18	54
Antiaircraft batteries	3	3	36	36	72
Radar stations	8	5	48	30	78
Total			786	510	1,296

In this case we did not take into consideration company strongpoints in brigade reserve positions, nor did we consider brigade reserves (tank companies in concentration areas), which are to be destroyed as secondary targets. The size of each platoon strongpoint is assumed to be equal to 6 hectares.

As can be seen from the table, for the simultaneous destruction of established targets, 1,296 guns (786 guns in Sector No. 1 and 510 guns in Sector No. 2) are required, which amounts to an average density of 108 guns per kilometer of the breakthrough front.

At the same time, for fire preparation, the army can call upon 432 guns from the three divisions of the first echelon, 144 guns from the second-echelon divisions, and upon 72 guns from the army artillery gun brigade, that is, a total of 648 guns.

This amount of artillery (based on the required density) is enough to carry out fire preparation on a 6-kilometer-wide sector of the front. In order to support a breakthrough of the enemy defense in the conditions we have been examining (two sectors on a 12-kilometer front), the army has to be reinforced by 648 guns (1,296 minus 648 equals 648), or 36 artillery battalions.

Artillery support of an attack, as is well known, can be carried out by successive concentration of fire (PSO), by moving barrage (OV), and sometimes only by fire concentration on request. In a number of instances, a combination of these types of fire is permitted. Successive concentration of fire is most advantageous when attacking an enemy occupying a defense by strongpoints (when these points have been reconnoitered with adequate thoroughness and precision), since it will suffice to call upon 1 to 2 batteries to deliver a successive concentration of fire against a platoon strongpoint covering an area of from 4 to 6 hectares, i.e., on the average, one artillery battalion will be required per kilometer of frontage.

To destroy enemy artillery (mortars) and recently discovered important targets during the beginning of an offensive, it is necessary to contemplate placing from 2 to 3 artillery battalions at the disposal of each chief of rocket troops and artillery of the divisions and one artillery battalion at the disposal of each chief of artillery of the regiments.

(See Table 2 on following page.)

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Table 2

Method of supporting an attack	To deliver a successive concentration of fire (PSO) or a moving barrage (OV)			To destroy artillery and mortars	Total artillery required (guns)	Can call upon (without regimental or battalion artillery)	Required reinforcement (guns)
	Frontage, in kms	Required per 1 km of frontage (guns)	Total guns				
Successive concentration of fire	16	18	288	216	504	432	72
Moving barrage	14	30	420	216	638	432	204
Combined (PSO and OV)	6 9	18 30	108 270	216	594	432	162

Note: When calculating flank coverage, 1 kilometer is assumed for a successive concentration of fire and 500 meters is assumed for a moving barrage (for each breakthrough sector).

Table 2 shows the calculation of the amount of artillery required to support an attack by various methods when an army is to break through an enemy defense in two sectors which have an overall extent of 12 kilometers.

As can be seen from the table, for artillery support using the method of successive concentration of fire (based on bringing into it the artillery of second-echelon divisions), we have to call upon an additional 4 battalions of artillery. If successive concentrations of fire are carried out simultaneously on two lines (as is proposed in the article of Marshal of Artillery K. Kazakov) with bringing into it at least one battalion per 2 kilometers of the frontage of the offensive's second line, then 12 additional battalions are required.

For a moving barrage, 12 additional artillery battalions are also required, and for support by the combined method (a moving barrage on the

main axis and a successive concentration of fire on the second axis), 9 battalions are required.

For artillery support of the offensive during combat in the depth of the enemy defense, and to assure a rapid rate of advance, powerful regimental groups (each composed of no less than 2 to 3 artillery battalions), and also divisional groups (3 to 4 artillery battalions each), are established in first-echelon divisions. The establishment of an army group, in our view, is advisable only during the period when the enemy's defense is being broken through.

Table 3

For regimental artillery groups	For divisional artillery groups	For army artillery group	Total artillery battalions	Can call upon (battalions)			Required reinforcement (artillery battalions)
				From 1st echelon divisions	From army field artillery brigade	Total artillery battalions	
12 - 18	9 - 12	4	25 - 34	12	4	16	9 - 18

Table 3 shows the number of artillery battalions required to establish regimental and divisional artillery groups and an army artillery group under the conditions in which a first-echelon army has three divisions (six regiments).

As seen from the table, to establish the indicated artillery grouping for an army will require, on the average, approximately 12 additional artillery battalions.

Thus a combined-arms army breaking through a defense on two sectors of a front that extends for 12 kilometers (without the use of nuclear weapons) requires reinforcement by 36 artillery battalions during the fire preparation phase and by 9 to 12 battalions during the phase of supporting the attack (in the condition when a moving barrage is delivered on one axis and a successive concentration of fire is delivered on the second axis). At the same time, such reinforcement will permit establishing the aforementioned artillery groupings (regimental artillery groups, divisional artillery groups, and an army artillery group).

If a portion of the artillery of the second echelon of the front (army field artillery brigade and the artillery of the three divisions), amounting to 16 artillery battalions, is engaged in the fire preparation delivered in the zone of the offensive of the army we have been discussing, then also in this case it will be necessary to reinforce the army with 3 to 4 artillery regiments, i.e., with one artillery division of present-day strength.

When the army is to break through the enemy defense in a single sector (on a frontage of 8 kilometers) and there are two divisions in the first echelon, calculations show that to conduct the fire preparation (with allowance for bringing into it the artillery of the second-echelon divisions of the army), there is a requirement to additionally bring into it up to 4 more artillery battalions, and to establish groupings that assure a high rate of advance during combat, 9 to 10 more artillery battalions will still be needed.

All of the calculations listed are correct only when the enemy defense is organized as strongpoints which are not connected with each other by communications trenches. Otherwise, the requirement for artillery to break through such a defense increases sharply.

Our probable enemy has at his disposal highly efficient earthmoving equipment which allows him to set up all types of trenches and communication trenches in a short period of time. Therefore, at times it will be very difficult to make out on the terrain the specific strongpoints in his overall defense system, and during fire preparation, it will be necessary to hit the enemy over the entire frontage of the breakthrough sector. In this case the requirement for artillery will increase from 1.5 to 2 times. All of this must be taken into account when planning an offensive operation in a non-nuclear war.

From the editors

The methodology proposed by the authors to determine the amount of artillery required when a breakthrough of an enemy defense is to be made without the employment of nuclear weapons, does not give rise to doubts from the point of view of the accuracy of the calculations carried out. However, the editorial office considers it its duty to call to the attention of readers (and primarily of artillerymen) the fact that a one-sided examination of the function and place of one or another arm of

troops in operations will always lead in practice to an overestimation of the requirements for that arm.

The solution of the problem examined must be sought not only by concentrating a large mass of artillery on the breakthrough sectors (which will always be linked to the necessity of considerably reinforcing with artillery one or another combined-arms formation), but primarily by maximum exploitation of the firing efficiency of guns and mortars, by increasing the accuracy of their fire, by using more effective methods of firing for effect, by increasing the effectiveness of the action of projectiles on the targets, by the wide use of salvo firing of rocket artillery, and by the use of operational-tactical and tactical rockets with cluster-type (burst-type) warheads. 50X1-HUM

Along with the problems of destroying the enemy on the battlefield, we must also solve the problem of the integrated use of all available forces and means (aircraft, tanks, combat vehicles, infantry, etc.), whose capabilities have considerably increased under present-day conditions. Only by such an approach can we most correctly determine the requirements for a particular branch of the armed forces (arm of troops) in an operation.

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